

Australian Curriculum linked lessons

The language of chance



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In providing a continued focus on tasks and activities that help to illustrate key ideas embedded in the *Australian Curriculum*, in this issue we focus on the Statistics and probability strand and the sub-strand of Chance.

Table 1. Chance content descriptions

Year 1	1	Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen' (ACMSP024)
Year 2	1	Identify practical activities and everyday events that involve chance. Describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible' (ACMSP047)
Year 3	1	Conduct chance experiments, identify and describe possible outcomes and recognise variation in results (ACMSP067)
Year 4	1	Describe possible everyday events and order their chances of occurring (ACMSP092)
	2	Identify everyday events where one cannot happen if the other happens (ACMSP093)
	3	Identify events where the chance of one will not be affected by the occurrence of the other (ACMSP094)
Year 5	1	List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions (ACMSP116)
	2	Recognise that probabilities range from 0 to 1 (ACMSP117)
Year 6	1	Describe probabilities using fractions, decimals and percentages (ACMSP144)
	2	Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies (ACMSP145)
	3	Compare observed frequencies across experiments with expected frequencies (ACMSP146)

Ask a student (or many adults for that matter) what the chance is that after rolling a six on a dice (the Macquarie Dictionary states that we can now use the word dice as both a singular and a plural form) after just rolling a six, and the answer is usually nil or something close to it. All-in-all many of us do not have a very well cultivated sense of chance and probability. Which is probably a good thing for the gaming industry

and the lotteries commissions! "Chance is the attribute, probability is the measurement" (Willis, Hardman, Jacob, Devlin, Powell, Sherrard, Tomazos & Treacy, 2013).

We tend to use the terms chance and probability as if they were synonymous, and for the most part, this is not unreasonable. The notion of chance however is a more 'everyday' understanding and is characterised by the use of language

which can be highly subjective in nature. Probability on the other hand is when mathematics is applied to the situation and should not be subjective (even if at times it seems counter-intuitive).

In the *Australian Curriculum* (ACARA, 2015), students are not asked to list outcomes of chance experiments and represent those probabilities until Year 5 (ACMSP116). Before this time, the focus is on identifying events that involve chance, and in developing everyday language to describe and order the events. It seems eminently sensible to involve students in activities which requires them to employ the language of chance.

Activity 1

(ACMSP024; ACMSP047; ACMSP067; ACMSP092)

It is a good idea to see what vocabulary the students already possess in regards to chance. Often, I write the phrases “will happen” and “won’t happen” on the board and then ask the students to give me related words. Usually the words “possible” and “impossible” are offered first, and there needs to be further prompting to add more vocabulary. Depending on the students, this process of determining their vocabulary can be quite slow and the students need some prompting with questions such as “How would you describe your chances of...?” However, in making the students ‘do the work’ and not being in too much of a hurry to provide them with the answers, it creates a sense of

ownership by the students over the completed list. My experience is that most if not all of the words/phrases that I would like to see introduced are raised, and if not, I will raise them to make certain of their inclusion.

From the list that is constructed, the students are asked to put the words in order between the two most polar words or phrases that are found. Once the words/phrases are ordered the students are then asked to provide some examples they feel belong beneath each of the headings and write these (usually with an illustration) on to cards.

This can be accomplished as individuals, but by using pairs, or perhaps groups of three, the proficiency of Reasoning can be exercised. Observing the construction and placement of the cards also gives the teacher a powerful assessment point, as students often will tell you much about their understanding through the manipulation of the cards and the explanations they offer.

Making the activity tactile (manipulating the cards) and contextual (using the students own life-experiences) increases their engagement. Getting them to take photographs with digital cameras to illustrate the cards has also proven to be very appealing to the students.

Depending on the age of the students, and their prior experiences with the language of chance, as many or as few of the words from Figure 1 can be employed in this activity as is appropriate. There is also no limit to the types and number of cards which can be produced.

• Will happen	• Won't happen	• Might happen	• Likely
• Unlikely	• Certain	• Possible	• Impossible
• Equal chance	• Fat chance	• A good chance	• 50/50
• Always	• Sometimes	• Never	• No chance
• Often	• Might	• Uncertain	• Probable
• Improbable	• Slim chance	• Buckley's chance*	• Least likely
• Less likely	• More likely	• Most likely	• Even chance
• Every chance	• Better than equal chance		

Figure 1. Words describing chance. *This is a strictly Australian colloquialism with a very doubtful provenance

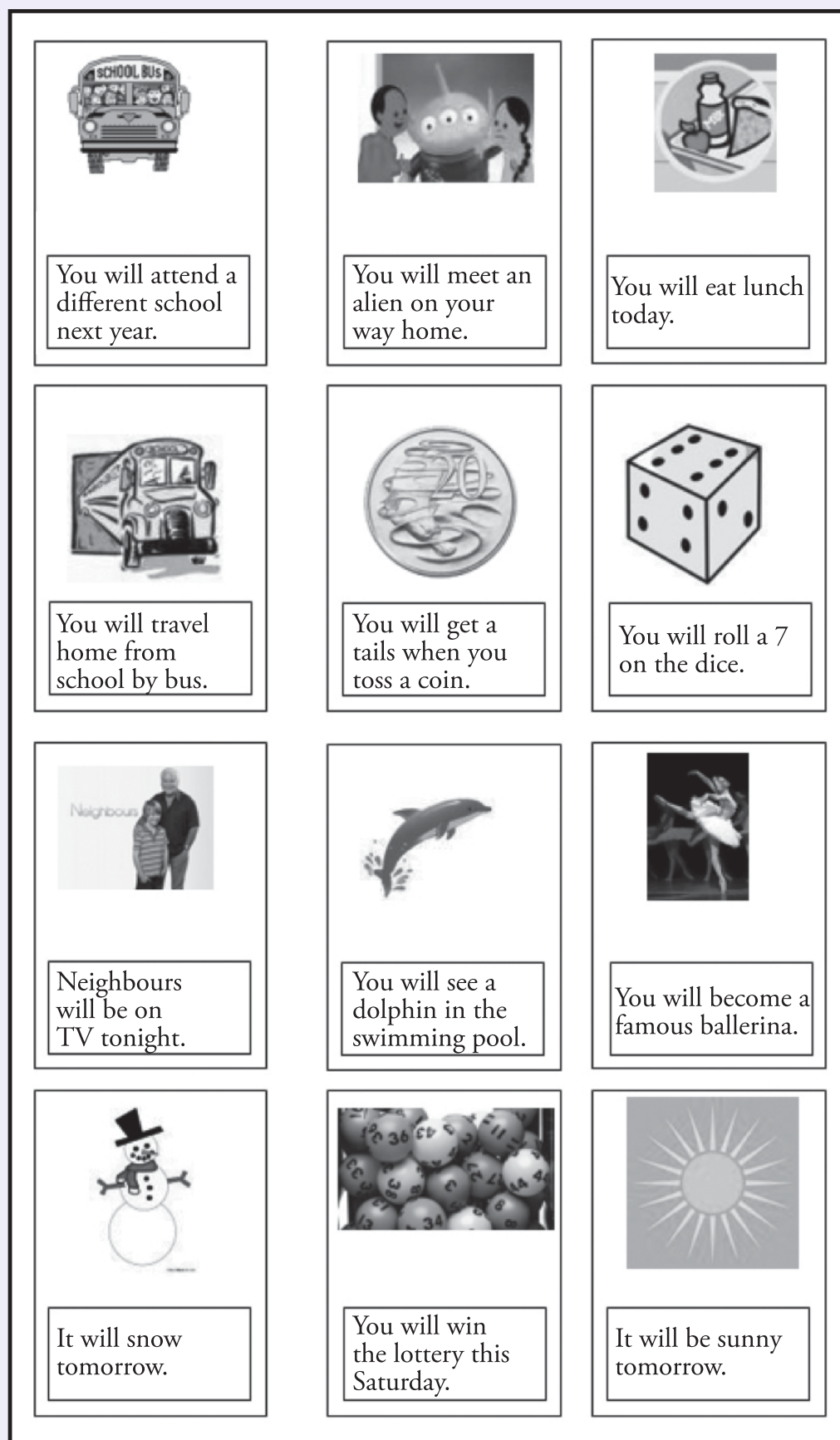


Figure 2. Statement cards for Activity 2

Activity 2

(ACMSP024; ACMSP047; ACMSP067; ACMSP092)

The students are asked to arrange statement cards (Figure 2) from least likely to most likely, or from impossible to certain (or two other terms which are polar).

One of the interesting aspects of this activity is exploring through Reasoning, where the students place the cards and their explanations for doing so. Often it raises the understanding that 'defining' some of these terms and phrases depends on the experiences of the person who is making the judgments.

After they have completed this activity, the students then discuss their choices with a partner. At this point if the student is convinced that changing the order would be advisable then they may do so, as long as they can articulate why the change should occur. Once any required changes have been made the student then pastes the statements, in order, into their workbook.

This is also quite a nice opportunity to paste the statements in the book on an open number line, with zero at one end and one at the other, to start to develop the link between chance and probability.

Activity 3

(ACMSP024; ACMSP047; ACMSP067; ACMSP092)

Students work in small groups to sort the cards under the statements of chance provided (see Figure 3).

• **This is certain to happen** • **This could happen** • **This is impossible**

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|----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| • Alan wins a raffle in which he has NO ticket. | • Tim chooses a black marble from a bag containing black and red marbles. |
| • Sarah wins a raffle in which she has bought every ticket. | • There will be a word with the letter "e" in it on this card. |
| • Catherine wins a raffle in which she has bought. | • An aeroplane will take off in the next hour. |
| • A real submarine in my pool at home. | • Helen throws a 7 with a normal dice. |
| • David buys lollies with a \$3 Australian coin. | • Glenda uses the word "word" in the next 24 hours. |
| • Debbie chooses a white counter from a bag containing only blue counters. | • Lina will play chasey at lunchtime. |
| • You will have a drink of water today. | • I will walk to the South Pole in the next hour. |
| • Amy throws a number between 1 and 6 on a normal dice. | • Christine will have a drink of water at lunchtime. |
| • A koala will share my lunch with me today. | • A dog will bark sometime today. |
| • It will rain tomorrow. | |

Figure 3. Describing chance, statement cards.

Activity 4

(ACMSP092)

Describe the likelihood of each event occurring as either: impossible (I), unlikely (U), likely (L), certain (C) or an even-chance (E)

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Christmas Day will be in December this year. • It will rain somewhere in Australia tomorrow. • A six legged elephant will drive me to school tomorrow. • Every student in our class will have sausages for dinner tonight. • A card is chosen from a pack of 52 playing cards and is either red or black. • The numbers 1 to 6 are written on separate pieces of paper, placed in a bag and the number 8 is drawn out. • Someone will win first prize in LOTTO next week. • A coin is tossed and the result is a tail. • Every person in the city of Adelaide likes Brussel sprouts. | <ul style="list-style-type: none"> • On the weekend I will go shopping with my parents. • Our dog will want dinner tonight. • Our dog might tip his bowl over. • Our cat will sleep tonight. • My mother says we will be going shopping after school today. • I will walk home from school today. • I will watch television after school today. • On Saturday I will be playing sport. • My aunty will visit over the weekend. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Figure 4. Describing the likelihood.

The idea that the statements on the left-hand side of Figure 4, are all general in nature and not specific is a point of interest. There is more likelihood of consensus in regards to these than if we are discussing statements which are more specific (and personal) such as the ones in the right-hand column. For instance the statement “My aunty will visit over the weekend” would be very dependent on the situation of each student. If a student does not have an aunty then the response is “impossible.” If the student lives in the same suburb as their aunty the answer is probably that this could happen. If their aunty lives next door, the answer is probably going to be that it is certain to happen.

Conclusion

First Steps in Mathematics: Chance and Data (2005) states that there are seven big ideas regarding understanding chance:

1. There are some things we are sure about and some that we unsure about.
2. There is special language to describe how likely we think things are to happen.
3. We can compare and order things in terms of their likelihood.
4. We say things have an equal chance of happening when we think they will happen equally often in the long run.

5. We can use numbers to describe how likely something is to happen
6. We can list and compare all the possible things that could happen to predict how likely it is to happen.
7. Sometimes we use data about how often an event has happened to predict how likely it is to happen in the future (p.11).

If we are to allow students the opportunity to achieve these seven key understandings then we must provide opportunities for the appropriate language to be developed, used and considered. This also allows the students to develop the proficiencies that are required in the *Australian Curriculum*.

Note for teachers

From time to time teachers ask what the difference is between the words possible, probable and likely. After discussion, the usual consensus is that, possible means something that may or may not occur (there does seem to be a hint of pessimism about using possible). For example “Advances in road-safety have made it possible for people to live longer.” Probable is supported by evidence strong enough to establish some level of certainty (the probable cause of her illness has been diagnosed as a virus). Likely is generally considered the most emphatic of the three terms and is defined in some dictionaries as meaning very probable (that seems to be the most likely of the explanations).

References

- Australian Curriculum, Assessment and Reporting Authority (ACARA). (2015). Retrieved from <http://www.australiancurriculum.edu.au/mathematics/curriculum/f-10?layout=1>.
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